

Focus

Lice, Damned Lice,
and Statistics

R. Robinson

Human lice continue to maintain a toehold (or clawhold?) in western Europe. Recent figures for head louse infection amongst English schoolchildren, collected by the Department of Health and Social Security, are shown in Fig. 1. These figures do not necessarily reflect the level of infection as a whole, since it has been demonstrated that peak infection levels are amongst children of pre-school age¹, but no figures are collected for this group.

The level of infection remains fairly constant at just over 2% of pupils in government maintained schools, having risen steeply in the late 1970s, but the number of examinations has dropped dramatically. This is due to two widely differing reasons. Some authorities have adopted a 'self-help' policy – instead of inspecting every child's head, a representative sample of children is taken; when lice are revealed, a warning letter, complete with details on how to diagnose and treat head lice, is sent to all parents. Unfortunately, other authorities have decided that, since head inspections are inefficient, they can be abandoned altogether. Such a move may cut the financial cost, but is unlikely to do anything for louse control, and may even encourage a louse population boom.

Elsewhere in Europe, available head louse infection statistics are higher than in Britain. In Barcelona, 4.4% of a survey of 6300 schoolchildren between the ages of 7 and 14 had lice², and in Italy prevalence was as high as 9.6%³.

If head lice are a disease of children, then crab lice are found mainly on adults, since they prefer to cling to the coarse body hair that develops after puberty. As with head lice, infection statistics are col-



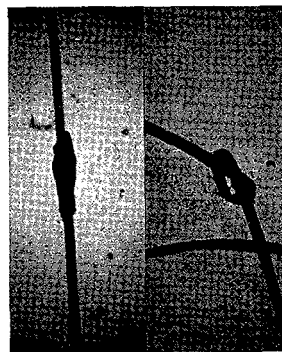
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lected from only one sector of the population, in this case patients attending VD clinics (Fig. 2). Obviously, most people attending these clinics do so because they have symptoms of venereal diseases, and crabs are of secondary importance. Many other cases of crab lice, with no complications, are self-diagnosed and treated. With no other figures available, however, the statistics show intriguing trends. There appears to be a rise in cases discovered up to 1982 that mirrors the total number of attendances, but is followed by a steep decline in 1983. Where separate figures for sexes are available, it seems that nearly twice as many men are infected as women, though whether this reflects a wider social trend is debatable.

Treatment formulations and regimes have been changing in recent years. Organochlorines, such as DDT and γ -BHC (lindane) are no longer used against head lice, following the discovery of organochlorine resistant strains^{4,5}, but no resistance to other insecticide groups has yet been found in head or crab lice. In Britain, pyrethroid treatments, already common on the continent, will probably become available soon, to join the existing malathion and carbaryl-based products.

The 'residual effect' whereby insecticide lotions bind with weak chemical bonds to hair and provide protection against re-infection, has fallen out of favour, due to the dangers of lice receiving sub-lethal doses as the effect weakens, some 4–6 weeks after treatment. In its place, a 2-hour treatment, long enough to kill the lice but too short for chemical bonding, is now advocated. Insecticidal shampoos, which rarely kill all the louse eggs on one application, now have clear instructions that they should be used as a course of at least three treatments.

Finally, it seems that Health Education and Politics can never agree; regular grooming is the best prophylactic against lice, but a campaign aimed to encourage



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Sebaceous conglomerates and hair knots are often confused with 'nits' – the eggs of head-lice

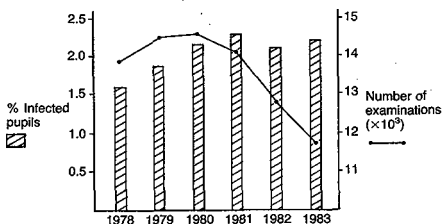


Figure 1 – Head louse cases 1978–83 (England only)

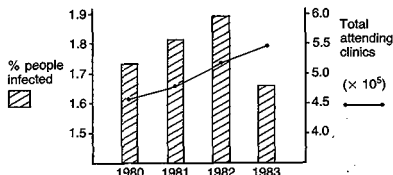
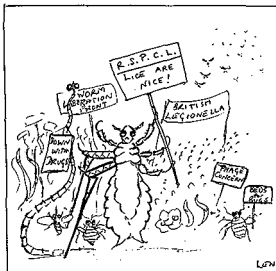


Figure 2 – Infection with lice 1980–83



the combing of hair, showing a mother combing her child's hair, and using the snappy catchphrase 'If you break their legs, lice can't lay eggs', ran foul of a London ethical committee. The campaign was sexist (why should only mothers be involved?) and, amazingly, cruel to animals – the lice! How long will it be before antibiotics are declared cruel to bacteria?

Rod Robinson is at the Medical Entomology Centre, University of Cambridge, Cambridge CB2 3DX, UK

References

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- 2 Municipal Institute for Health, Barcelona. (1984) Report on louse infections. Barcelona, May–June
- 3 Majori, G. et al. (1983) *Atti XII Cong. Naz. Ital. Entomol.* 417–418
- 4 Maunders, J.W. (1971) *Med Off.* 125, 27
- 5 Blommers, L. (1978) *Acta Leidensia*, 46, 7–8

Advances in Trypanosome culture

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C.J. Hawke

The demand for rapid drug-screening systems against pathogenic protozoa has stimulated research on methods of *in vitro* culture. *In vitro* systems are desirable not only because of the speed with which candidate drugs can be screened, but also because they reduce the number of animals used in the development of each test compound.

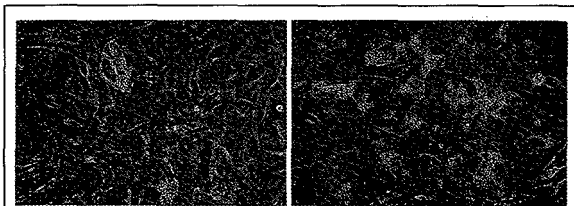
In the case of African trypanosomes, the procyclic forms that occur in the tsetse fly vector have been cultured with relative ease for some time, but the trypomastigote bloodstream forms that occur in the mammalian host have proved difficult to cultivate. Early attempts at growing these stages produced only short-term survival of trypanosomes^{2–5}, but with the development of *in vitro* tissue culture methods for the long-term cultivation of bloodstream forms^{6–8} the scope for *in vitro* studies has greatly expanded. The first successful systems all utilised a fibroblast-like monolayer of cells, known as a feeder layer, which sustained a healthy growing population

of bloodstream forms; bovine blood⁶, Chinese hamster lung cells⁷, embryonic *Microtus montanus* (North American field vole)⁸ and embryonic *M. agrestis* (European short-tailed vole) have been used as sources of primary tissue from which the feeder layers were developed. In general, systems without feeder layers fail to maintain growing trypanosome populations, and it seemed that physical contact with the bovine feeder layer was essential for the *in vitro* survival of trypanosomes⁹. Our efforts to grow *Trypanosoma brucei rhodesiense* in medium that had been previously used for growing *Microtus* cells (thus containing any vital metabolites produced by the cells) maintained viable parasites for only 24 hours. However, Baltz et al. (in press) have described a system without a feeder layer that maintains long-term growth of trypanosomes. It appears that low concentrations of 2-mercaptoethanol are essential, together with three other components that are interchangeable depending on what serum is used. If this

feeder-free system proves successful it will undoubtedly revolutionise trypanosome cultivation.

Bovine fibroblast cultures have been shown to be useful for cloning trypanosomes *in vitro*^{10,11}. Antigenic variation (AV) was demonstrated to occur in such cloned populations and it was therefore postulated that interaction with the host's immune system was not a necessary requirement for AV to occur¹¹. A new *in vitro* blood incubation infectivity test (BIIT) that determines the subspecific identity of *T. brucei* (whether or not they are infective to humans), was developed by adapting the *Microtus* cell system¹². Previous tests required the trypanosomes to be incubated for 5h in human serum followed by inoculation into clean mice which then had to be checked for at least 30 days for positive or negative parasitaemia^{13,14}. Equivocal results occasionally occurred, probably due to the insensitivity of the test. However, the new *in vitro* BIIT was able to detect single human-serum resistant parasites among high numbers of human-serum sensitive parasites¹². *In vitro* BIIT using *Microtus* cultures is performed regularly as a research tool by P. Dukes (personal communication) and similar methods have been used to test the trypanocidal properties of sera from African wild game (A. Mulla, unpublished) and from patients with liver disease (C. Hawke et al., unpublished).

Perhaps the greatest attribute of these tissue culture methods lies in their potential for the development of *in vitro* screens for trypanocidal drugs. Borowy et al. (in press), have utilised the bovine fibroblast system to demonstrate differences in sensitivity to 21 standard trypanocides among



Phase contrast photomicrographs of choroid plexus primary cultures supporting the growth of *Trypanosoma brucei*. Morphologically, the cultures consist of groups of epithelial-like cells enclosed by bands of fibroblast-like cells. Note how the trypanosomes form intercellular clusters – this indicates a well established culture.

C.J. Hawke